CLAIMS

What we claim is:

1. A purified and isolated nucleic acid molecule encoding a transferrin receptor protein of a strain of *Haemophilus* or a fragment or an analog of the transferrin receptor protein.

2. The nucleic acid molecule of claim 1, which encodes an immunogenic truncated analog of the transferrin receptor protein.

3. The nucleic acid molecule of claim 2 wherein said truncated analog is truncated from the C-terminus of the transferrin receptor protein.

4. The nucleic acid molecule of claim 3 encoding only a truncated Tbp2 protein of the *Haemophilus* strain.

5. A purified and isolated nucleic acid molecule having a DNA sequence selected from the group consisting of:

(a) any one of the DNA sequences set out in Figure 3, 4, 5, 6, 7, 8, 9, 10 or 11 (SEQ ID NOS: 1, 2, 3, 4, 105, 108, 110, 112, 114) or the complementary DNA sequence of any one of said sequences;

(b) a DNA sequence encoding one of the amino acid sequences set out in Figure 3, 4, 5, 6, 7, 8, 9, 10, 11 or 31 (SEQ ID NOS: 5, 6, 7, 8, 9, 10, 11, 12, 106, 107, 109, 111, 113, 115) or the complementary DNA sequence thereto; and

(c) a DNA sequence which hybridizes under stringent conditions to any one of the DNA sequences defined in (a) or (b).

6. The nucleic acid molecule of claim 5, wherein the DNA sequence defined in (c) has at least about 90% sequence identity with any one of the DNA sequences defined in (a) or (b).

7. An expression vector adapted for transformation of a host comprising the nucleic acid molecule of claim 1 or 5 and expression means operatively coupled to the nucleic acid molecule for expression by the host of said

transferrin receptor protein of a strain of *Haemophilus* or the fragment or the analog of the transferrin receptor.

8. The expression vector of claim 7 which is selected from any one of the clones of Table 8.

9. A transformed host containing the expression vector of claim 7.

10. A recombinant transferrin receptor protein or fragment or analog thereof producible by the transformed host of claim 9.

11. An immunogenic truncated Tbp2 protein of a strain of *Haemophilus*.

12. The Tbp2 protein of claim 11 which is truncated from the C-terminus thereof.

13. The Tbp2 protein of claim 12 which is one of the truncated proteins shown in Figure 31 for Eagan strain or the equivalent protein from another *Haemophilus* strain.

14. An immunogenic composition, comprising at least one active component selected from the group consisting of:

(A) a purified and isolated nucleic acid molecule encoding a transferrin receptor protein of a strain of *Haemophilus* or a fragment or an analog of the transferrin receptor protein;

(B) a purified and isolated nucleic acid molecule having a DNA sequence selected from the group consisting of:

(a) any one of the DNA sequences set out in Figure 3, 4, 5, 6, 7, 8, 9, 10 or 11 (SEQ ID NOS: 1, 2, 3, 4, 105, 108, 110, 112, 114) or the complementary DNA sequence of any one of said sequences;

(b) a DNA sequence encoding one of the amino acid sequences set out in Figure 3, 4, 5, 6, 7, 8, 9, 10, 11 or 31 (SEQ ID NOS: 5, 6, 7, 8, 9, 10, 11, 12, 106, 107, 109, 111, 113, 115) or the complementary DNA sequence thereto; and

(c) a DNA sequence which hybridizes under stringent conditions to any one of the DNA sequences defined in (a) or (b);

(C) a recombinant transferrin receptor protein or fragment or analog thereof producible is a transformed host containing an expression vector comprising a nucleic acid molecule as defined in (A) or (B) and expression means operatively coupled to the nucleic acid molecule for expression by the host of the recombinant transferrin receptor protein or fragment or analog thereof;

(D) an isolated and purified Tbp1 protein of a strain of *Haemophilus* free from the Tbp2 protein of the *Haemophilus* strain;

(E) an isolated and purified Tbp2 protein of a strain of *Haemophilus* free from the Tbp1 protein of the *Haemophilus* strain;

(F) an immunogenic truncated Tbp2 protein of a strain of *Haemophilus*,

(G) a synthetic peptide having no less than six amino acids and no more than 150 amino acids and containing an amino acid sequence corresponding to a portion only of a transferrin receptor protein of a strain of bacteria or of an analog the transferrin receptor protein; and

(H) a live vector for delivery of transferrin receptor to a host, comprising a vector containing the nucleic acid molecule of (A) or (B);

and a pharmaceutically acceptable carrier therefor, said at least one active component producing an immune response when administered to a host.

15. A method for inducing protection against disease caused by a bacterial pathogen that produces transferrin receptor, comprising administering to a susceptible host an effective amount of the immunogenic composition of claim 14.

16. A method of making an immunogenic truncated Tbp2 protein of a *Haemophilus* strain, which comprises:

constructing an expression vector comprising a nucleic acid molecule encoding an immunogenic truncated Tbp2 protein of a *Haemophilus* strain operatively coupled to a control sequence;

introducing said expression vector into a host; and

expressing the immunogenic truncated Tbp2 protein from the host.

17. The method of claim 16 wherein said expression vector is any one of the expression vectors shown in Table 8.